REMARKS/ARGUMENTS

Claims 1-14 and 18-36 are active in this application, claims 15-17 and 37-40 having been cancelled. Claims 1, 2 and 35 have been amended to specify that the fibers being formed are submicron sized nanofibers. This amendment is supported by original claim 2 and the specification. No new matter has been added by these amendments.

The present invention relates to a method for electroblowing nanofibers comprising:

forcing a polymer fluid through a spinneret in a first direction towards a collector located a first distance from the spinneret, to form submicron sized nanofibers, while simultaneously blowing a gas through an orifice that is substantially concentrically arranged around the spinneret, wherein the gas is blown substantially in the first direction to contact the nanofibers;

wherein an electrostatic differential is generated between the spinneret and the collector; and

collecting the nanofibers;

wherein the polymer fluid comprises a member selected from the group consisting of hyaluronan, copolymers of hyaluronan and mixtures thereof.

One of the important aspects of the present invention is that the claimed process is particularly useful for the production of nanofibers made of hyaluronan containing polymers. As disclosed in the present application this is especially important, since hyaluronan is known to have unusually high viscosity making it difficult to prepare a highly concentrated solution, and hyaluronan solution shows a high surface tension. This results in making hyaluronan containing polymers very difficult to process using conventional spinning techniques. As disclosed in the present application (and contrary to the mention of hyaluronan in the Gravett et al application), it is known in the art that spinning hyaluronan using conventional electrospinning can be done, but only with minimal success, at low throughput. Melt

blowing of hyaluronan is relatively out of the question, since hyaluronan has much too high a viscosity for use of a melt process. Applicants have found that by use of electroblowing as described in the present application, it is possible to produce, with significantly higher throughput than other methods, hyaluronan nanofibers.

The claims stand rejected under 35 U.S.C. 103 over Reneker in view of Gravett, or over Kim in view of Gravett. As acknowledged by the Examiner, neither of Reneker or Kim disclose the use of their process to produce hyaluronan fibers. In fact, Reneker gives merely a generic description of polymers that can be used in their method (which Applicants have pointed out previously is in no way related to electroblowing of the present invention, since Reneker produces a film of their polymers, which is then blasted apart into nanofibers with a gas jet, which is NOT substantially concentrically arranged around the spinneret as required in the present invention) and Kim mentions only a handful of polymers useful in their process (see paragraph [0020] of Kim) none of which are biopolymers such as hyaluronan. The Examiner continues to maintain that Reneker discloses a spinneret that has the gas jet substantially concentrically arranged around the spinneret. However, the Examiner must interpret the reference based upon the entirety of its disclosure, and it is clear that Reneker discloses extruding the polymer solution through a **slit** to form a sheet or film. After the sheet or film is prepared, a gas is impinged on the sheet to blast it apart and form fibers. The present invention on the other hand requires that the spinneret form **fibers**, NOT a sheet or film. Further, the gas jet of the present invention is substantially concentrically arranged around a spinneret that forms fibers, NOT an extruder die that forms a sheet or film. The gas jet directs the gas to contact the fibers that are already formed by the spinneret. Accordingly, Reneker cannot suggest such an arrangement. The Examiner has used the reference of Gravett to suggest the use of hyaluronan in the methods of either Reneker or Kim.

Gravett discloses perivascular wraps used for maintaining or improving the integrity of body passageways following surgery. In various locations within Gravett, the use of a variety of polymers is disclosed with respect to the carrier, or as a mesh. Hyaluronan is mentioned as one potential member of biodegradable polymer that can be used. The examiner has further relied on paragraph [0116] of Gravett which discloses various generic techniques that can be used to generate the fibers used to form the mesh or carrier of Gravette, including melt-processing techniques such as electrospinning, gel state spinning, melt spinning, compression molding, melt-blowing or wet-laying. However, the Examiner's reliance on Gravett as disclosing the preparation of hyaluronan is misplaced, since, as noted above, it is well known in the art that hyaluronan is notoriously difficult to spin in high throughput. Further, **Gravett does not address the spinning of nanofibers**, but instead of normal denier fibers which are more readily produced using higher viscosity spinning solutions due to the larger spinneret holes used.

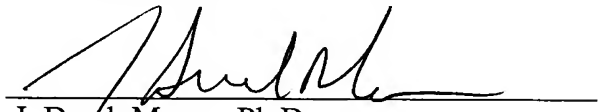
The Examiner appears to take the position that because Gravette mentions hyaluronan as one of a myriad of fibers that one of ordinary skill would expect that hyaluronan could be used in the process of Reneker or Kim, despite the well known fact that hyaluronan is notoriously difficult to spin into nanofibers. The Examiner has failed to take into account these difficulties inherent with hyaluronan spinning, particularly spinning of hyaluronan into nanofibers in high throughput, which are described within the present specification. The present inventors were the first to recognize that by combining aspects of melt blowing and electrospinning to provide the present invention electroblowing process, can one achieve high throughput production of hyaluronan **nanofibers**. The disclosure of Gravette nowhere specifies or exemplifies any method for production of hyaluronan fibers, much less nanofibers. One of ordinary skill would not therefore be motivated to pluck hyaluronan or

hyaluronan containing polymers from the listing in Gravette, for use in either Reneker or Kim's process. Accordingly, the rejections should be withdrawn.

Applicants submit that the application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



J. Derek Mason, Ph.D.
Attorney of Record
Registration No. 35,270

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)